InfiniScale® IV 8-Port QSFP 40 Gb/s InfiniBand Switch User Manual

P/N:MIS5022Q-1BRR, MIS5022Q-1BFR, MIS5022Q-1BFR, MIS5022Q-1BRR, MIS5022Q-1BFC, MIS5022Q-1BRC

Rev 1.4

www.mellanox.com

NOTE:
THIS HARDWARE, SOFTWARE OR TEST SUITE PRODUCT (“PRODUCT(S)”) AND ITS RELATED DOCUMENTATION ARE PROVIDED BY MELLANOX TECHNOLOGIES “AS-IS” WITH ALL FAULTS OF ANY KIND AND SOLELY FOR THE PURPOSE OF AIDING THE CUSTOMER IN TESTING APPLICATIONS THAT USE THE PRODUCTS IN DESIGNATED SOLUTIONS. THE CUSTOMER'S MANUFACTURING TEST ENVIRONMENT HAS NOT MET THE STANDARDS SET BY MELLANOX TECHNOLOGIES TO FULLY QUALIFY THE PRODUCT(S) AND/OR THE SYSTEM USING IT. THEREFORE, MELLANOX TECHNOLOGIES CANNOT AND DOES NOT GUARANTEE OR WARRANT THAT THE PRODUCTS WILL OPERATE WITH THE HIGHEST QUALITY. ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NONINFRINGEMENT ARE DISCLAIMED. IN NO EVENT SHALL MELLANOX BE LIABLE TO CUSTOMER OR ANY THIRD PARTIES FOR ANY DIRECT, INDIRECT, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES OF ANY KIND (INCLUDING, BUT NOT LIMITED TO, PAYMENT FOR PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY FROM THE USE OF THE PRODUCT(S) AND RELATED DOCUMENTATION EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

Mellanox Technologies
350 Oakmead Parkway Suite 100
Sunnyvale, CA 94085
U.S.A.
www.mellanox.com
Tel: (408) 970-3400
Fax: (408) 970-3403

© Copyright 2012
Mellanox, BridgeX, ConnectX, CORE-Direct, InfiniBridge, InfiniHost, InfiniScale, PhyX, SwitchX, Virtual Protocol Interconnect and Voltaire are registered trademarks of Mellanox Technologies, Ltd. FabricIT, MLNX-OS and Unbreakable-Link are trademarks of Mellanox Technologies, Ltd. All other trademarks are property of their respective owners.

All other trademarks are property of their respective owners.

Ethernet Switch Hardware User ManualInfiniScale® IV 8-Port QSFP 40 Gb/s InfiniBand Switch User Manual

Contents

Contents 3
List of Figures 5
List of Tables 6
Revision History 7
About this Manual 8
Intended Audience 8
Related Documentation 8
Conventions 8
Mellanox Part Numbering Legend 9
Chapter 1 Overview 10
1.1 Features 10
1.2 Serial Number and Product Version Information 10
Chapter 2 Installation Safety Warnings 12
Chapter 3 Externally Managed Switches 15
Chapter 4 Hardware Basic Operation and Installation 16
4.1 Switch Platform Hardware Overview 16
4.1.1 LED Assignments 16
4.1.2 Port Connector LED Assignment 19
4.2 Air Flow 19
4.3 QSFP Cable Power Budget Classification 20
4.4 Interfaces 20
4.4.1 Port Connector Interfaces 20
4.5 Management and Firmware Updating Interfaces 20
4.5.1 RJ-45 Connector (I2C) 20
Chapter 5 Installation 22
5.1 Package Contents 22
5.2 Installing the Switch in the Rack 23
5.2.1 Table Top Installation 23
5.2.2 Installation Procedure for a Single Switch Center-of-Rack Installation 24
5.2.3 Installation Procedure for a Side by Side Installation 25
5.2.4 Power Connections and Initial Power On 28
5.2.5 Grounding the Switch 29
5.2.6 Cable Installation 29
5.2.7 Supported Approved Cables 30
5.3 Disassembly of the Switch from the Rack 30
5.3.1 Disassembly Procedure — Single Switch Centered Installation 30
5.3.2 Disassembly Procedure — Side by Side Installation 30
5.4 Disposal 31
5.5 Updating Firmware 31
5.5.1 Current Firmware Revision 31
5.5.2 Open SM 34
Chapter 6 Troubleshooting 35
Appendix A Specification 37
A.1 Approved Cables 38
A.2 EMC Certifications 38
Appendix B SFP+ Interface 39
Appendix C QSFP Interface 42

Appendix D Replacement Parts Ordering Numbers 44
Appendix E Avertissements de sécurité d'installation (French) 45
Appendix F Installation - Sicherheitshinweise (German) 48
Appendix G Advertencias de seguridad para la instalación (Spanish) 52
Appendix H Special Regulations Regarding Finland, Sweden, Denmark, and Norway 55

List of Figures

Figure 1:	Management MAC Label	11
Figure 2:	Switch System Front Panel	16
Figure 3:	Status LEDs	17
Figure 4:	Port Numbering	20
Figure 5:	Top and Bottom Ports	20
Figure 6:	RJ45 I2C Connector	21
Figure 7:	Placing the Bumpers	23
Figure 8:	Installation Kit for a Single Centered Installation	24
Figure 9:	Connect the Mounting Brackets	25
Figure 10:	Installation Kit Parts for a Side by Side Installation	26
Figure 11:	Screw on the Switch Mounted Rails	26
Figure 12:	Caged Nut Placement	27
Figure 13:	Front Panel Orientation	27
Figure 14:	Top and Bottom Ports	29
Figure 15:	MTUSB-1 with Cables	33
Figure 16:	I2C Cable Connected to IS5022	34
Figure 17:	QSFP Male and Female Connections	43

List of Tables

Table 1:	Revision History Table	7
Table 2:	Reference Documents	8
Table 3:	Switch Status LED Configurations	17
Table 4:	Fan LED Configurations	18
Table 5:	Bad Port LED Configurations	18
Table 6:	Port Connector Physical and Logical Link Indications	19
Table 7:	Installation Kit Options	22
Table 8:	Installation Kit According to Rack Size	28
Table 9:	IS5022 Specification Data	37
Table 10:	SFP+ Pinout	40
Table 11:	InfiniBand QSFP Connector Pinout	42
Table 12:	Replacement Parts Ordering Numbers	44

Revision History

Table 1 - Revision History Table

Date	Revision	Description
June, 2012	Rev 1.4	Fixed Formatting and Typos.
Oct. 2011	Rev 1.3	Removed reference to Installation kit included in package.
Mar. 2011	Rev 1.2	Added note and figure to blank panel installtion step. Made changes to the installation process for the *two switch frame*. Made changes to FW burning sections.
Feb. 2011	Rev 1.1	Removed UID LED support
Jan. 2011	Rev 1.0	Initial Release

About this Manual

This manual describes the installation and basic use of the Mellanox IS5022 switch, which is based on the InfiniScale® IV switch device.

Intended Audience

This manual is intended for users and system administrators responsible for installing and setting up the switch platforms listed above.

The manual assumes familiarity with the InfiniBand® Architecture Specification.

Related Documentation

Additional Documentation available from Mellanox:

Table 2 - Reference Documents

Switch Firmware and Firmware Update Tools	See http://www.mellanox.com > Support > Download Firmware Tools

Conventions

Throughout this manual, the name IS5022 and the term switch are used to describe the 8-port QSFP 40Gb/s InfiniBand switch unless explicitly indicated otherwise.

The following icons are used throughout this document to indicate information that is important to the user.

This symbol signals recommendations to the user.

This symbol indicates information that is helpful to the user.

This symbol indicates a situation that can potentially cause damage to hardware or software.

BEWARE! This symbol indicates a situation that can potentially cause personal injury or damage to hardware or software.

Mellanox Part Numbering Legend

Place	Field	Decoder
M		Mellanox Technologies
IS	System Type	InfiniScale Switch
50	Model	Family
FF	Form factor	22 = 8 Ports
-	Separator	
#	Power supplies	1 = 1 power supply
M	Depth of the Unit	B = short depth
Y	Air Flow direc- tion	R= Connector side to rear side airflow F= Rear side to connector side airflow
R	RoHS	R=RoHS6

1 Overview

This *User Manual* provides an overview of the InfiniBand switch product, an 8-port switch capable of up to 640Gb/s of non-blocking switching capacity. This switch is based on the fourth generation InfiniScale InfiniBand switch device. The platform delivers industry leading bandwidth, latency, and scalability in a half width 1U form factor. The platform can be tiered to build larger multi-stage networks in a variety of topologies such as Fat-Tree, Mesh, 3D Torus etc. Mellanox IS5022 switch systems are an ideal choice for top-of-rack connectivity from small to extremely large sized clusters. This switch can also be used with smaller departmental or back-end clustering uses with high-performance needs, such as storage, data base and GPGPU clusters. Networks built with IS5022 systems can carry converged traffic with the combination of assured bandwidth and granular quality of service. IS5022 systems provide up to 40Gb/s full bidirectional bandwidth per port.

The switch platform comes pre-installed with all necessary firmware and is configured for standard operation within an InfiniBand fabric. This switch requires an InfiniBand compliant Subnet Manager running from one of the hosts or another managed switch or Fabric Management software running on the switch. All that is required for normal operation is to follow the usual precautions for installation and to connect the switch to the HCAs or other switches within the fabric. Once connected, the Subnet Management software automatically configures and begins utilizing the switch.

It is recommended that the Mellanox OpenFabrics software package be installed on all nodes connected to the IS5022. The software package provides a subnet manager and network management tools as well as connectivity software for servers and storage, and is available on the Mellanox web site. See Chapter 3 for more information.

Basic installation and hardware maintenance is covered in “Hardware Basic Operation and Installation” on page 16.

1.1 Features

- On board temperature monitoring
- Reset Push button on front panel
- Front Panel indication LEDs:
  - Status LED (Red / Yellow / Green)
  - Fans Status LED (Red / Green)
  - UID LED (Blue)
  - Bad port LED (Yellow / Green)

1.2 Serial Number and Product Version Information

The serial number and GUID for the switch are found on the Mellanox logo. The serial number and product version information are found on the label seen in the figure below.

Generic Product label Also on this label is the GUID identifier for the switch.

Figure 1: Management MAC Label

Management MAC:
0002C902004C

2 Installation Safety Warnings

Warnings in French can be found on page 45. Warnings in German can be found on page 48. Warnings in Spanish can be found on page 52.

1. **Installation Instructions**

Read all installation instructions before connecting the equipment to the power source.

2. **Over-temperature**

This equipment should not be operated in an area with an ambient temperature exceeding the maximum recommended: 45°C (113°F). Moreover, to guarantee proper air flow, allow at least 8cm (3 inches) of clearance around the ventilation openings.

3. **Stacking the Chassis**

The chassis should not be stacked on any other equipment. If the chassis falls, it can cause bodily injury and equipment damage.

4. **Double pole / Neutral Fusing**

This system has double pole/neutral fusing. **Remove all power cords before opening the cover of this product or touching any internal parts.**

5. **During Lightning - Electrical Hazard**

During periods of lightning activity, do not work on the equipment or connect or disconnect cables.

6. **Copper Cable Connecting/Disconnecting**

Copper cables are heavy and not flexible, as such they should be carefully attached to or detached from the connectors. Refer to the cable manufacturer for special warnings/ instructions.

7. Rack Mounting and Servicing

When this product is mounted or serviced in a rack, special precautions must be taken to ensure that the system remains stable. In general you should fill the rack with equipment starting from the bottom to the top.

8. High Leakage Current

WARNING: High leakage current; Earth connection essential before connecting supply.

9. Connect a Valid Ground to this Device

Before connecting this device to the power line, the protective earth terminal screws of this device must be connected to the protective earth in the building installation.

10. Equipment Installation

This equipment should be installed, replaced, and/or serviced only by trained and qualified personnel.

11. Equipment Disposal

Disposal of this equipment should be in accordance to all national laws and regulations.

12. Local and National Electrical Codes

This equipment should be installed in compliance with local and national electrical codes.

13. Installation Codes

This device must be installed according to the latest version of the country national electrical codes. For North America, equipment must be installed in accordance to the applicable requirements in the US National Electrical Code and the Canadian Electrical Code.

14. Interconnection Of Units

Cables for connecting to the unit RS232 and Ethernet Interfaces must be UL certified type DP-1 or DP-2. (Note- when residing in non LPS circuit)

Overcurrent Protection: A readily accessible Listed branch circuit overcurrent protective device rated 20 A must be incorporated in the building wiring.

15. Suitable Enclosure

Suitable electrical, mechanical and fire enclosure shall be provided by the end product manufacturer and or the end user.

16. UL Listed and CSA Certified Power Supply Cord

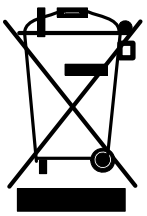
For North American power connection, select a power supply cord that is UL Listed and CSA Certified, 3 - conductor, [16 AWG], terminated with a molded plug rated at 125 V, [13 A], with a minimum length of 1.5m [six feet] but no longer than 4.5m.

For European connection, select a power supply cord that is internationally harmonized and marked “<HAR>”, 3 - conductor, minimum 1.0 mm 2 wire, rated at 300 V, with a PVC insulated jacket. The cord must have a molded plug rated at 250 V, 10 A.

17. Do Not Use the Switch as a Shelf or Work Space.

Caution: Slide/rail mounted equipment is not to be used as a shelf or a work space. The rails are not intended for sliding the unit away from the rack. It is for permanent installation at final resting place only, not used for service and maintenance.

18. WEEE Directive



According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste.

Dispose of this product and all of its parts in a responsible and environmentally friendly way.

3 Externally Managed Switches

Externally managed (unmanaged) switches are plug and play out of the box. All switches come with the latest firmware (FW) burned on the Flash. Updating the firmware on externally managed switches can be performed in-band only. When new firmware is available, an email notification is sent to registered users with the link to the Mellanox firmware download site. The download site has the Mellanox firmware tool package and full instructions for updating firmware.

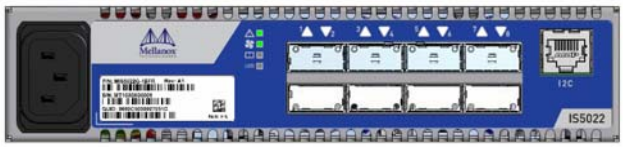
Externally managed switches must be managed by management software installed on a node or on another managed switch that can be anywhere in the fabric. This can be OpenSM, MLNX-OS, Mellanox FabricIT™ EFM, Mellanox UFM™, or a third party Subnet Manager.

4 Hardware Basic Operation and Installation

4.1 Switch Platform Hardware Overview

Figure 2 shows the front view of the switch. The figure shows port configurations for the switch systems, interface I2C connector, and various status LEDs. Externally managed switches come with an I2C RJ45 connector.

Figure 2: Switch System Front Panel



All InfiniBand connectivity is via the connector side panel. All connectors can support active cables.

4.1.1 LED Assignments

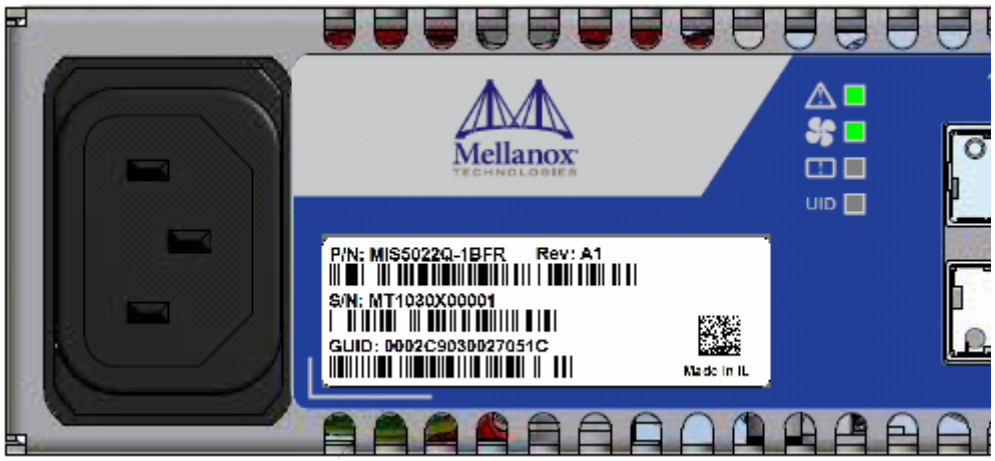
4.1.1.1 System Status Indicators

The System Status Indicators are located on the left side of the front (connector side) panel. The system status indicators should display as follows:

When the switch is plugged in, within three seconds

- The Status LED should light up green.
- The Fan LED should light up green.
- The Bad Port LED should be off.
- The Unit ID LED should be off.

Figure 3: Status LEDs



If the status LED shows red after 30 seconds unplug the switch and call your Mellanox representative for assistance.

If the fan LED shows red unplug the switch and call your Mellanox representative for assistance.

If the switch shuts down due to over-temperature, unplug the switch, wait 5 minutes and replug in the switch. For more information See “Troubleshooting” on page 35.

4.1.1.2 Status LED

The status indicator is located on the left side of the front panel (connector side) of the unit. The following status conditions are possible:

Table 3 - Switch Status LED Configurations

LED Configuration	LED Description
Off	No power to the switch.
Solid Green	OK – the switch is running. All OK.
Blinking Green	Switch is booting up.

LED Configuration	LED Description
Red	Error – there is a problem with power output from the power supply, or there is a thermal shut down.

4.1.1.3 Fan Indicators

The fan indicator is located on the left side of the front panel (connector side) of the unit. The following fan status conditions are possible:

Table 4 - Fan LED Configurations

LED Configuration	FAN LED
Off	There is no power to the fans.
Green	OK – the fans are running.
Red	Error – the fans are not operating properly. Replace the switch.

Fans must be operating while the power supply is plugged in.

If the switch shuts down due to over-temperature, unplug the switch, wait 5 minutes and replug in the switch. For more information See “Troubleshooting” on page 35.

4.1.1.4 Bad Port LED

The bad port indicator is located on the left side of the front panel (connector side) of the unit. The following bad port conditions are possible:

Table 5 - Bad Port LED Configurations

LED Configuration	Description
Off	OK – all ports are up and running.
Flashing Orange	Error – one or possibly more ports has just received a symbol error.

This LED shows symbol errors. Possible causes for this are:

- bad cable
- bad connection
- bad connector

This LED lights up when one or more ports is receiving a symbol error. The LED immediately goes off until the next symbol error is received.

4.1.1.5 UID LED Switch Identifier

The UID LED is a debug feature that will become available to customers in the near future. For details please contact Mellanox Technologies support.

4.1.1.6 Port Connector LED

The port LEDs are assigned to the ports as in figure:

4.1.2 Port Connector LED Assignment

Above the ports are two LEDs, one for the upper port ▲ and one for the lower port ▼. The following table shows the port status according to the LED indication.

Table 6 - Port Connector Physical and Logical Link Indications

LED Configuration	LED Description
Off	Physical link down / Default
Solid Green	Physical link up no traffic
Flashing Green	Physical link up with traffic
Flashing Orange	Physical errors

This LED when flashing orange shows port physical errors. Possible causes for this are:

- bad cable
- bad connection
- bad connector
- bad cage

4.2 Air Flow

These switches can come with two air flow patterns. The two patterns are:

- power side inlet to connector side outlet
- connector side inlet to power supply side outlet

The air flow is specified in the product model number. See “Mellanox Part Numbering Legend” on page 9.

4.3 QSFP Cable Power Budget Classification

All IS5022 QSFP switches are designed for active cables with a max power per module of 2.0W. This is power level 2 according to the QSFP Public Specification.

4.4 Interfaces

4.4.1 Port Connector Interfaces

The connector side of the switch has 8 QSFP ports. These are placed in two rows, 4 ports to a row. The ports are labelled as shown in Figure 4. The bottom row ports are flipped from the top row. See Figure 5.

Figure 4: Port Numbering

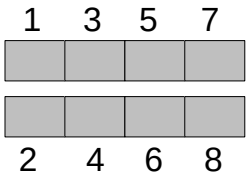
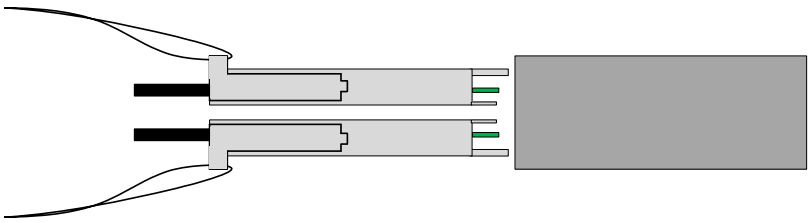


Figure 5: Top and Bottom Ports



4.5 Management and Firmware Updating Interfaces

The externally managed switch platform does not require any programming or configuration to operate as a basic InfiniBand switch and includes all of the necessary functionality to operate with external standard InfiniBand Subnet Management software such as OFED, FabricIT, UFM etc.

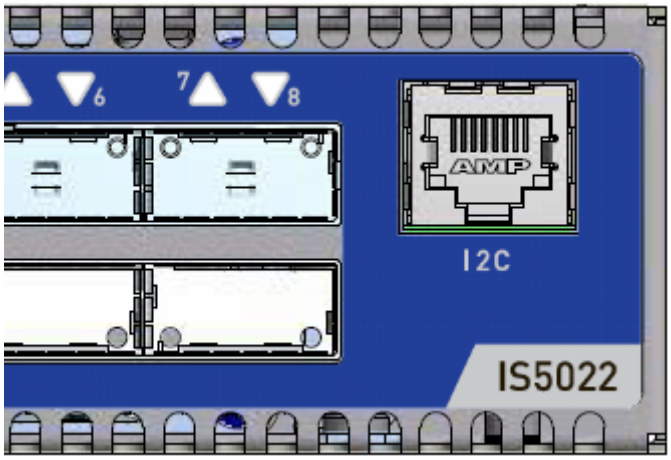
There is one interface to connect to the switch. It is an I2C RJ45 interface labelled “I2C”. Use this connector to update firmware (as a last resort) and for advanced debug.

Update firmware inband only.

4.5.1 RJ-45 Connector (I2C)

There is an “I2C” interface on the front panel.

Figure 6: RJ45 I2C Connector



All firmware updates should be done in-band using Mellanox Firmware Management Tools.

The I2C connector is available only on externally managed switches and is used to update firmware should in-band firmware update not work. You will need to order an MTUSB-1 USB to I2C adapter to make use of the I2C interface. The I2C connection provides access to Flash and EEPROMs. This is for advanced users and FAEs only.

The externally managed switches are plug and play and all firmware updates should be done in-band. The I2C connection should only be used if the firmware image was corrupted to the point that the regular firmware tools cannot successfully reburn the correct image.

Warning: Any red status LED is cause for concern and must be dealt with immediately. It can take up to 30 seconds to boot up, during which time the status LED may indicate red.

5 Installation

There are three possible installation kits for the MIS5022 switch. Make sure that you have the installation kit that works with your rack. Installation kits are not included with the switch and should be ordered separately.

This switch does NOT come with an installation kit. There are three optional installation kits. You must order the kit separately.

Table 7 - Installation Kit Options

OPN	Description	For Rack Depths
MIS000811	Centered single switch installation kit	400mm – 800mm
MIS000830	Side by side installation kit with long rail slides	650mm – 800mm
MIS000831	Side by side installation kit with short rail slides	400mm – 650mm

5.1 Package Contents

The package includes:

- 1 switch
- 1 box containing 1 power cord type B 6ft US 125V 10A chord
- 1 installation guide
- 1 parts list

Before you install your new switch, unpack the system and check to make sure that all the parts have been sent, check this against the parts list. Check the parts for visible damage that may have occurred during shipping.

If anything is damaged or missing, contact your customer representative immediately.

The rack mounting holes conform to the IEA-310 standard for 19-inch racks. Guarantee proper ventilation by leaving 8cm (3”) of space to the front and rear of the switch. This will ensure proper airflow through the chassis. This is crucial for maintaining good airflow at ambient temperature. In particular, route cables so that they do not impede the air into or out of the chassis.

5.2 Installing the Switch in the Rack

This installation kit can only be used to install this switch.

Tools and Parts

Tools required and customer supplied parts

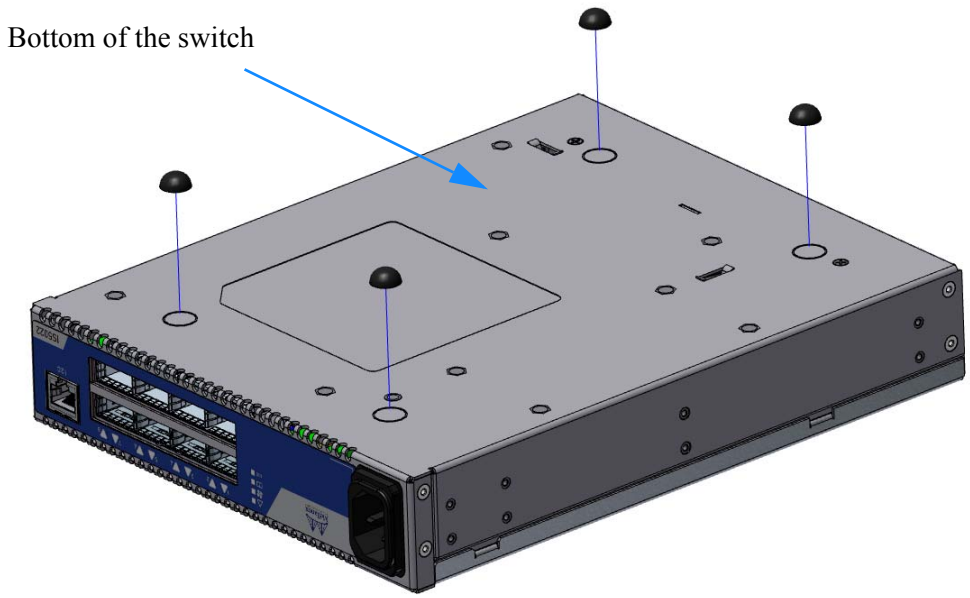
- Phillips Screwdrivers #1 and #2
- ESD Strap
- ESD mat
- Grounding screw
- Grounding wire sufficient to reach a valid ground

The following procedure can be done by one person.

5.2.1 Table Top Installation

1. Peel and stick the four rubber bumpers into the bottom of the switch. Place them in the round circles.

Figure 7: Placing the Bumpers



2. Place on a flat surface. Make sure the switch sits solid on the surface.
3. Connect the power cord.

4. Connect the data transfer cables.

5.2.2 Installation Procedure for a Single Switch Center-of-Rack Installation

Installation kit parts for a single switch center-of-rack installation:

- 2 front mounting brackets
- 4 M6 bolts
- 8 flat head screws
- 4 caged nuts for the rack vertical supports

1. Place the ESD mat on the floor where you will be working and put on the ESD strap. Make sure the ESD strap is touching your skin and that the other end is connected to a verified ground.
2. Screw the two front brackets to the front side of the switch using 4 flat head screws for each bracket.

Figure 8: Installation Kit for a Single Centered Installation

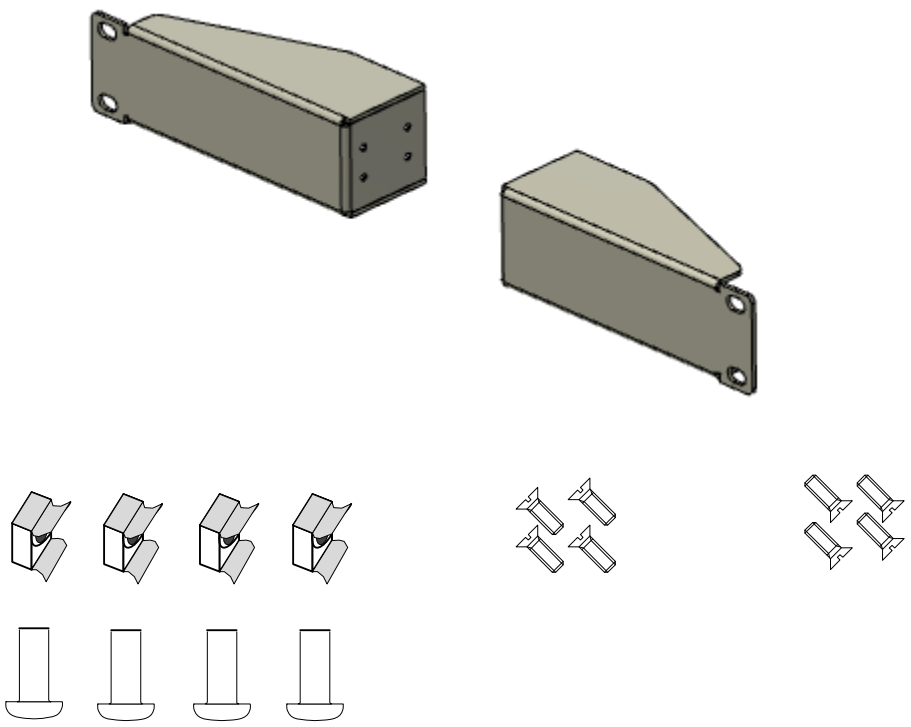
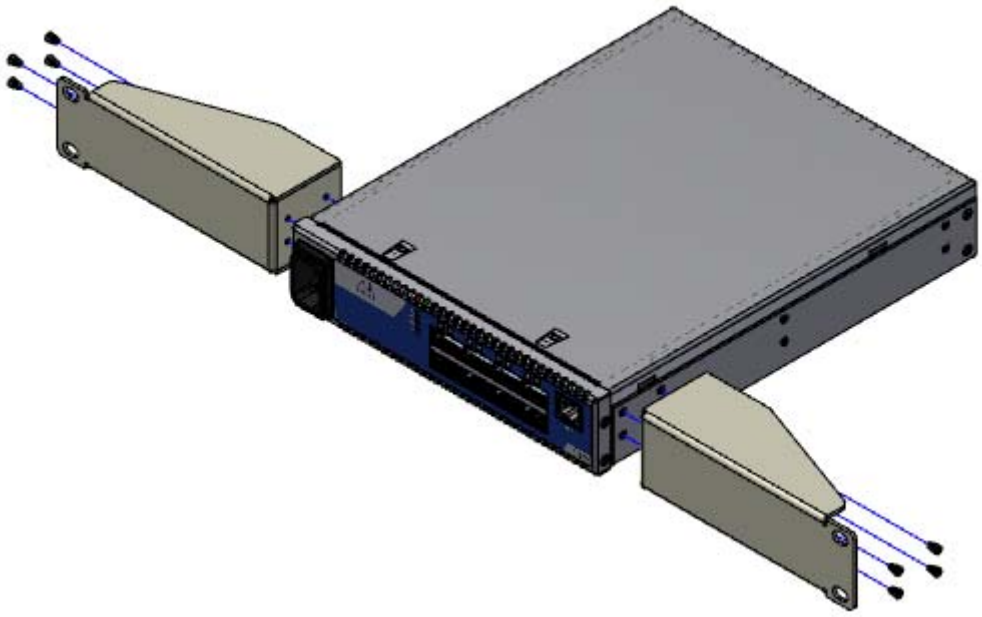


Figure 9: Connect the Mounting Brackets



3. Place four caged nuts into the rack at the U level you want to install the switch.
4. While supporting the switch, catch and tighten the four bolts into the caged nuts.
5. Ground the switch.
6. Plug in the power cord.
7. You can start connecting all of the cables to the switch.

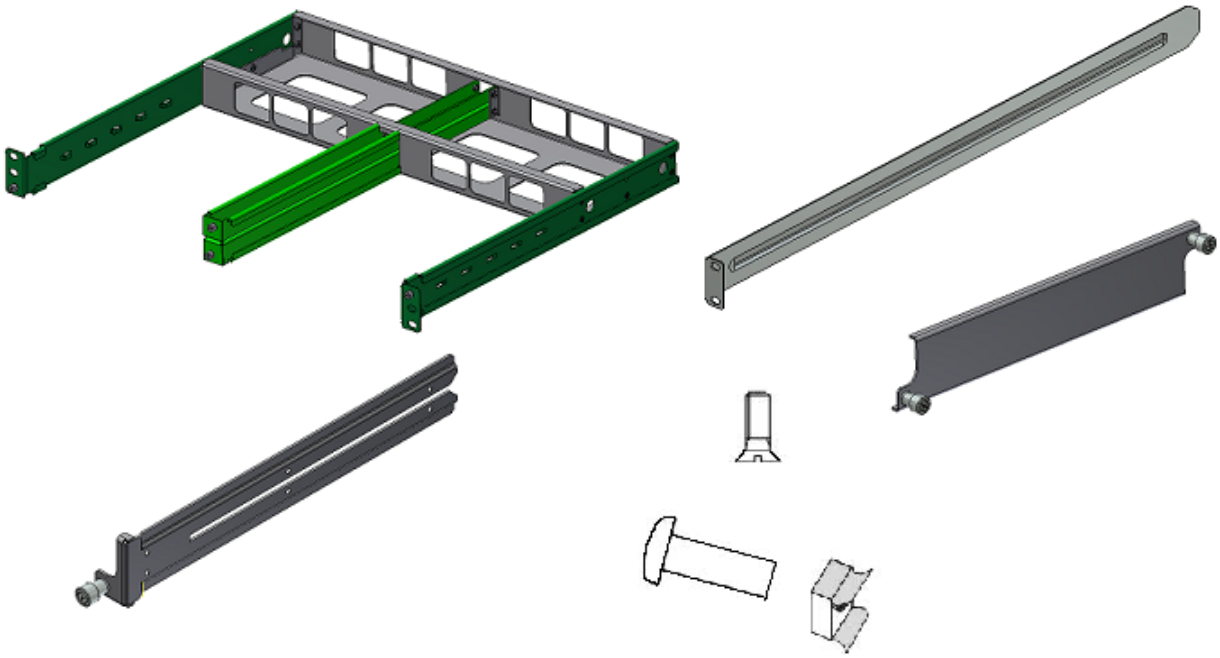
5.2.3 Installation Procedure for a Side by Side Installation

Installation kit parts for a side by side installation:

- 1 Two switch metal frame
- 4 switch mounted rails
- 24 flat head screws
- Two rail slides
- 8 pairs of caged nuts and bolts
- 1 blank cover

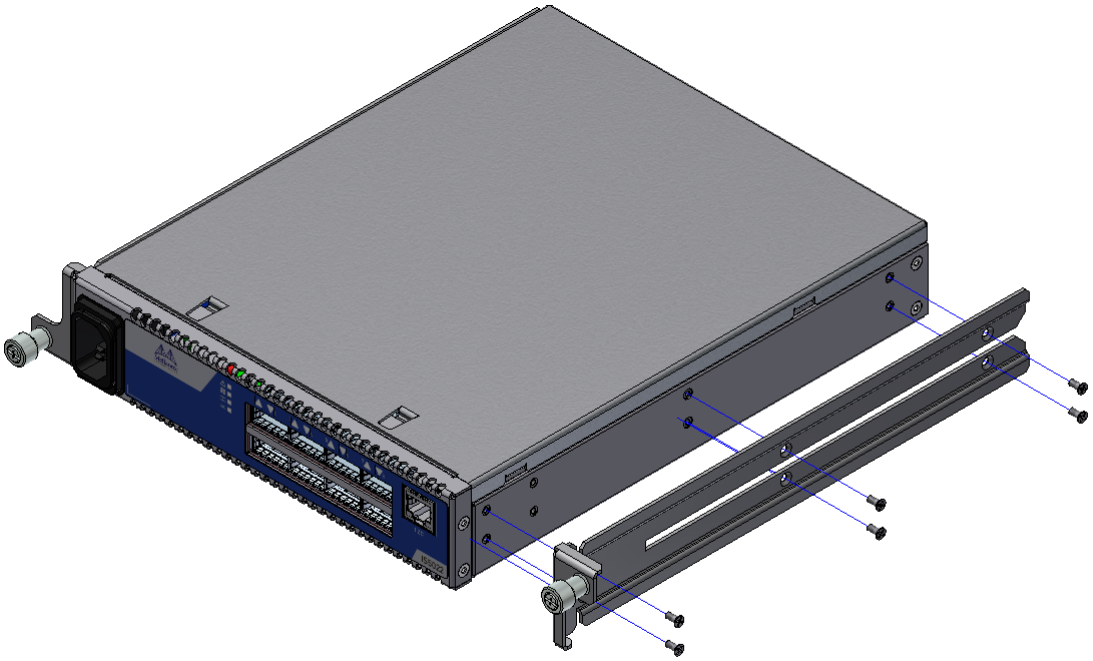
The installation kits come with enough switch mounted rails and flat head screws to install two switches.

Figure 10: Installation Kit Parts for a Side by Side Installation



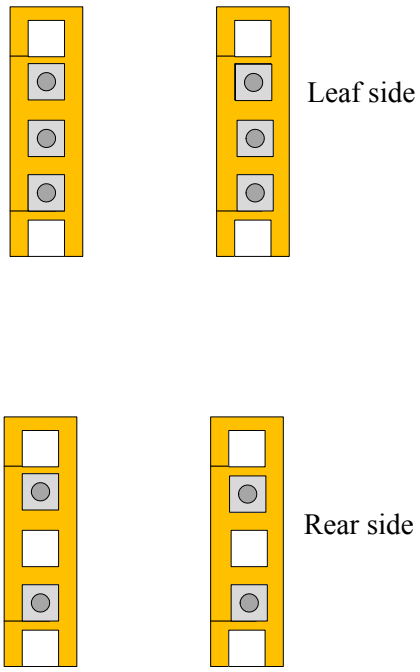
1. Place the ESD mat on the floor where you will be working and put on the ESD strap. Make sure the ESD strap is touching your skin and that the other end is connected to a verified ground.
2. Screw the two switch mounted rails to the switch using six flat head screws per rail.

Figure 11: Screw on the Switch Mounted Rails



3. Place eight caged nuts into the rack at the level you want to mount the switch. Four go on the Leaf side and four go on the rear side.

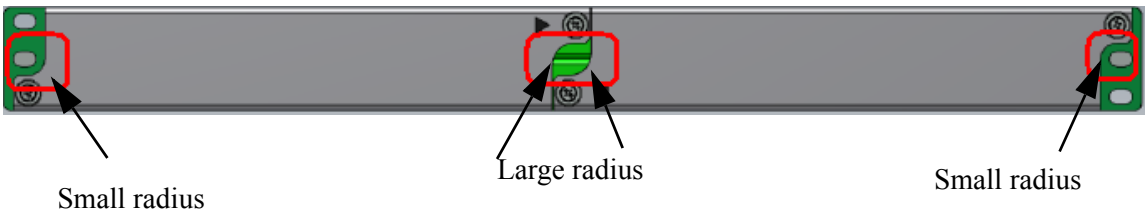
Figure 12: Caged Nut Placement



4. Install the *two switch frame* into the rack. This frame goes on the leaf side of the rack. **Do not tighten the screws into the caged nuts.**
5. Slide the rail slides into the frame and screw the bolts into the rack caged nuts on the rear side of the rack. **Do not tighten the screws into the caged nuts.**
6. Slide the switch into the frame, and screw in the capture bolts into the frame.
7. Tighten the capture nuts.
8. Install the blank panel into the frame opposite the switch, or install a second switch.

The front panel is not symetrical. The large radius always goes ot the center of the frame.

Figure 13: Front Panel Orientation



9. Tighten the capture nuts.
10. Tighten all eight screws for the caged nuts to 9.2 Nm or 81.5 pound inches.
11. Ground the switch.
12. Plug in the power cord.
13. You can start connecting all of the cables to the switch.

5.2.3.1 Installation Kits

There are two installation kit options. One long and one short. Both the long and the short installation kit can be used with this switch.

Table 8 - Installation Kit According to Rack Size

Kit OPN	Rack Size
MSX60-BKIT	40-60 cm
MSX60-SKIT	60-80 cm

For racks from 60cm to 80cm deep either use the standard depth switches with the long rail kit or the short switches with the long rail kit.

5.2.4 Power Connections and Initial Power On

Each PSU has a separate AC receptacle. The input voltage is auto-adjusting for 90 - 264 VAC, 50-60Hz power connections. The power cords should be standard 3-wire AC power cords including a safety ground and rated for 15A or higher.

Caution: The power supplies in this switch are Double Pole / Neutral Fusing.

Caution: The switch platform will automatically power on when AC power is applied. There is no power switch. Check all boards, power supplies, and fan tray modules for proper insertion before plugging in a power cable.

Caution: After inserting a power cable and confirming the green system status LED light is on; make sure that the Fan Status indicator shows green.

If the fan status indicator is not green then unplug the power connection and check that the fan module is inserted properly and that the mating connector of the fan unit is free of any dirt and/or obstacles.

Caution: When turning off the switch, make sure ALL Connector LEDS are off to ensure a powered down status.

5.2.5 Grounding the Switch

Check to determine if your local or national electrical codes require an external ground to all IT components. If so, connect a ground wire to one of the casing screws and connect the other end to a valid ground. If you choose to not use the ground screw, make sure that the rack is properly grounded and that there is a valid ground connection between the chassis of the switch and the rack. Test the ground using an Ohm meter.

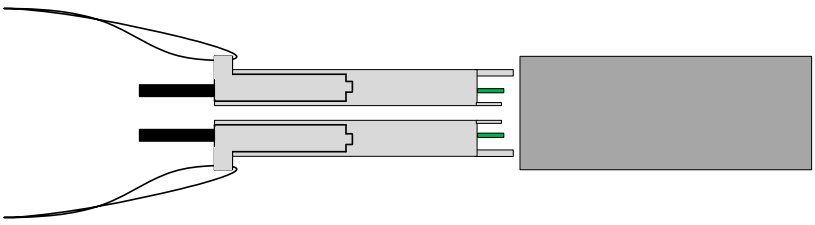
Some national and/or local codes may require IT components to be bonded and externally grounded (not including the power cord ground). You must follow all national and local codes when installing this equipment.

5.2.6 Cable Installation

All cables can be inserted or removed with the unit powered on. To insert a cable, press the connector into the port receptacle until the connector is firmly seated. The orange LED indicator corresponding to each port will light when the physical connection is established (that is, when the unit is powered on and a cable is plugged into the port with the other end of the connector plugged into a functioning port). After plugging in a cable, lock the connector using the latching mechanism particular to the cable vendor. When a logical connection is made the green light will come on. When data is being transferred the light will blink green.

Cables in the bottom row should be inserted up side down in relation to the how the cables are inserted in the top row.

Figure 14: Top and Bottom Ports



To remove, disengage the locks and slowly pull the connector away from the port receptacle. The LED indicator will turn off when the cable is unseated.

Care should be taken not to impede the air exhaust flow through the ventilation holes next to the data connection ports. Cable lengths should be used which allow for routing horizontally around to the side of the chassis before bending upward or downward in the rack.

When inserting cables into the switch always insert the center row cable before the top and bottom row cables.

5.2.7 Supported Approved Cables

For a list of all approved cables see:

www.mellanox.com/related-docs/user_manuals/Mellanox_approved_cables.pdf

5.3 Disassembly of the Switch from the Rack

5.3.1 Disassembly Procedure — Single Switch Centered Installation

To disassemble the switch from the rack:

1. Unplug and remove all connectors.
2. Unplug the power cord.
3. Remove the ground wire.
4. Remove the four M6 screws holding the switch to the rack. Support the switch while removing the screws, or the switch may fall out of the rack.
5. Loosen the two thumbscrews holding the switch in place.
6. Slide the switch out of the rack.

This switch needs to be supported when it is being disassembled.

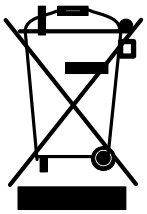
7. Remove the rails.
8. Remove the caged nuts.

5.3.2 Disassembly Procedure — Side by Side Installation

To disassemble the switch from the rack:

1. Unplug and remove all connectors.
2. Unplug the power cord.
3. Remove the ground wire.
4. Unscrew the 2 center bolts from the connector side of switch.
5. Slide the switch from the rack.
6. Remove the rail slides rails from the rack.
7. Remove the 10 caged nuts.

5.4 Disposal



According to the WEEE Directive 2002/96/EC, all waste electrical and electronic equipment (EEE) should be collected separately and not disposed of with regular household waste.

Dispose of this product and all of its parts in a responsible and environmentally friendly way.

For proper disassembly instructions see the Mellanox website.

5.5 Updating Firmware

When you buy the switch, it comes with the latest firmware burned on the board. All firmware updates should be done in-band. Go to the Mellanox website and confirm that the firmware is the latest. If not reburn the latest firmware from the download site. New firmware versions will be posted on the Mellanox firmware download page:
http://www.mellanox.com => Support > Download Center.

You will need the Mellanox Firmware Tools package to update firmware for this switch. It can also be downloaded from:
http://www.mellanox.com. => Support > Software and Drivers.

You will also need to download and unzip the firmware binary image. This is provided in the Mellanox website at: http://www.mellanox.com => Support > Download Center and go to the InfiniScale IV Switch systems. Click in the table for the firmware image that you need.

5.5.1 Current Firmware Revision

The user can query for the currently loaded firmware revision by using the command:

```
ibstat
```

(part of MFT package). Other tools like Flint can also be useful.

5.5.1.1 Instructions for Reprogramming Over the InfiniBand Network

To update a switch device having a specific GUID (for example, 0x00000006660abcd0) or LID, the following are the recommended steps to update the device firmware.

1. Make sure all subnet ports are in the active state. One way to check this is to run opensm, the Subnet Manager.

```
[root@mymach]> /etc/init.d/opensmd start
opensm start     [  OK  ]
```

2. Make sure the local ports are active by running ‘ibv_devinfo’.
3. Obtain the device LID.

1. Use the “mst ib add” command:
The “mst ib add” runs the ibdiagnet/ibdiscover tool to discover the InfiniBand fabric and then lists the discovered IB nodes as an MST device under /dev/mst/ directory. These devices can be used for access by other MFT tools.

```
[root@mymach]> mst ib add
-I- Discovering the fabric - Running: ibdiagnet -skip all
-I- Added 10 in-band devices
```

2. List the discovered MST inband devices run “mst status”.

```
[root@mymach]> mst status
MST modules:
------------
   MST PCI module loaded
   MST PCI configuration module loaded
...
Inband devices:
------------------
/dev/mst/CA_MT25418_sw005_HCA-1_lid-0x0001
/dev/mst/SW_MT47396_lid-0x0011
/dev/mst/SW_MT48438_lid-0x0003
```

Identify the switch you want to update according to its description or its LID.

In the examples below we will use `SW_MT48438_lid-0x0003` **as our target switch.**

Query the switch to determine the current firmware version:

```
[root@mymach]> flint -d /dev/mst/SW_MT48438_lid-0x0003 q
Image type:     FS2
FW Version:     7.3.0
Device ID:      48438
Chip Revision:  A0
Description:    Node         Sys image
GUIDs:          0002c902004177d8 0002c902004177db
Board ID:       n/a (MT_0D00110012)
```

```
VSD:        n/a
PSID:       MT_0D00110012
```

Burn the switch:

```
flint -d /dev/mst/SW_MT48438_lid-0x0003 -i ./fw-IS4-rel-7_4_0-
Q_A1.bin -qq b
```

5.5.1.2 Reprogramming the Switch Through The I2C Port

This interface is for Debug and Troubleshooting by FAEs and advanced users only.

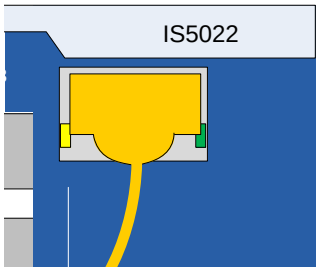
The I2C connector should only be used when the firmware cannot be updated in-band.

Use the MTUSB-1 adapter (available from Mellanox) to reprogram the switch firmware using a server or PC running MFT.

Figure 15: MTUSB-1 with Cables

The MTUSB adapter comes with three cables, but has only two connections for cables. One cable is an I2C cable with DB9 female connectors on both ends. One cable is a I2C cable with DB9 female connector to RJ45 male. Use the cable that matches your switch. The other is a USB cable with one type A host connection to be connected to the server or PC and a type B connection to be connected to the MTUSB adapter.

Figure 16: I2C Cable Connected to IS5022



With the switch connected to a computer through the MTUSB, it is now possible to reprogram the SPI Flash memory.

5.5.1.3 Instructions for Reprogramming Through the I2C Port

1. Make sure that:
   - the MTUSB I2C cable is connected to the switch and USB cable is connected to a computer
   - MFT is running on the computer
   - "mtusb-1" mst device appears in "mst status"
2. Set the switch I2C switch to allow access by running:

```
> mlxi2c -d /dev/mst/mtusb-1 -s IS5023 p /IS4
```

3. Run the burn command:

```
flint -d /dev/mst/mtusb-1 -i ./fw-IS4-rel-7_4_0-Q_A1.bin -qq b
```

4. Power cycle the switch, by unplugging and re-plugging the power cord, to load the new firmware.

5.5.2 Open SM

To manage the Mellanox switch system using OFED, download Mellanox OpenFabrics from http://www.mellanox.com > Support > InfiniBand Software and Drivers.

Be sure to read and follow all of the instructions regarding the installation and use of these tools.

6 Troubleshooting

As soon as a switch is plugged in, continuously monitor the status light. Make sure that it turns green within 30 seconds of booting up.

Status LED and Fan LED

If the fan LED is red make sure that the ambient temperature is within the range specified in the specification section of the appendix.

If any of the LEDs are red after 30 seconds, unplug the switch and call your Mellanox representative.

Power supply unit:

1. Check that the power cable has a voltage within the range of 100 - 240 volts AC.
2. Remove and reinstall the power cable.

The green power LED for the fans does not come on:

Caution: Do not run the switch if the System Status LED for the Fans is red or off!

The connector LED for the port connector does not come on:

1. Check that both ends of the cable are connected.
2. Check that the locks on the ends are secured.
3. Make sure that the latest firmware version is installed on both the cards and the switch.
4. If media adapters are used, check that the all connections are good, tight, and secure.

The connector LED is flashing orange:

1. Check that the Subnet Manager has been started.
2. Check the cable is connected properly at both ends.
3. Check that the cable is good.
4. Check that the connections are good (no cable weight on the connector, no twists in the cable at the connector, etc.).
5. Check the port connectors at both ends.

The switch is off:

1. Unplug the switch.
2. Wait 5 minutes.
3. Plug in the switch.
4. If the switch does not come on, check the power supply.

5. If the switch comes on, use the management software to determine the cause of the shut-down.
6. Check the temperature of the switch.
7. Check the ambient air temperature to make sure it is not too high.
8. Check the Fan status.

The switch is not working and unresponsive:

1. Unplug the switch.
2. Wait 5 minutes.
3. Plug in the switch.
4. If the switch does not come on, check the power supplies.
5. If the switch comes on, use the management software to determine the cause of the shut-down.
6. Reset the switch.

Appendix A: Specification

Table 9 - IS5022 Specification Data

Physical		Power and Environmental	
Size:	1.73” (1U) H x 7.9” W x 9.8” D 44mm X 200mm X 250mm	Input Voltage:	100-240 VAC 50-60Hz
Weight:	1.92kg 4.23 lbs	Power Consumption Typ: 8 port QDR	
Mounting:	19” Rack mount	Passive Cables	46W
		Active Cables	66W
SerDes Speeds	10, 20, 40 Gb/s per port		
Connectors and Cabling:	QSFP Cable	Power Consumption Max: 8 port QDR	
Optical Cable Max Length:		Passive Cables	55W
		Active Cables	75W
Port Types:	QSFP	QSFP Max Power per port for active cables:	2.0W
		Temperature:	0 to 45 Celsius
		Humidity:	10% - 90% non-condensing
Protocol Support		**Regulatory Compliance**	

Table 9 - IS5022 Specification Data

Physical		Power and Environmental	
InfiniBand: QoS: Management:	Auto-Negotiation of (40Gb/s, 20Gb/s, 10Gb/s) 8 InfiniBand Virtual Lanes for all ports Baseboard, Performance, and Device management Agents for full InfiniBand In-Band Management	Safety: EMC (Emissions): Environmental: Acoustic: Sound power level:	US/Canada: cTUVus EU: IEC60950 International: CB USA: FCC, Class A Canada: ICES, Class A EU: EN55022, Class A EU: EN55024, Class A EU: EN61000-3-2, Class A EU: EN61000-3-3, Class A Japan: VCCI, Class A EU: IEC 60068-2-64: Random Vibration EU: IEC 60068-2-29: Shocks, Type I / II EU: IEC 60068-2-32: Fall Test RoHS R-6 ISO 7779 ETS 300 753 70.5 dB(A) or 7.1 Bel
Scalability and Performance		**Reliability, Availability and Serviceability Features**	
Switching Performance: Addressing: Switching Capacity	Simultaneous wire-speed any port to any port 48K Unicast Addresses Max. per Subnet 16K Multicast Addresses per Subnet 640Gb/s		

A.1 Approved Cables

For a list of all approved cables see:

www.mellanox.com/related-docs/user_manuals/Mellanox_approved_cables.pdf

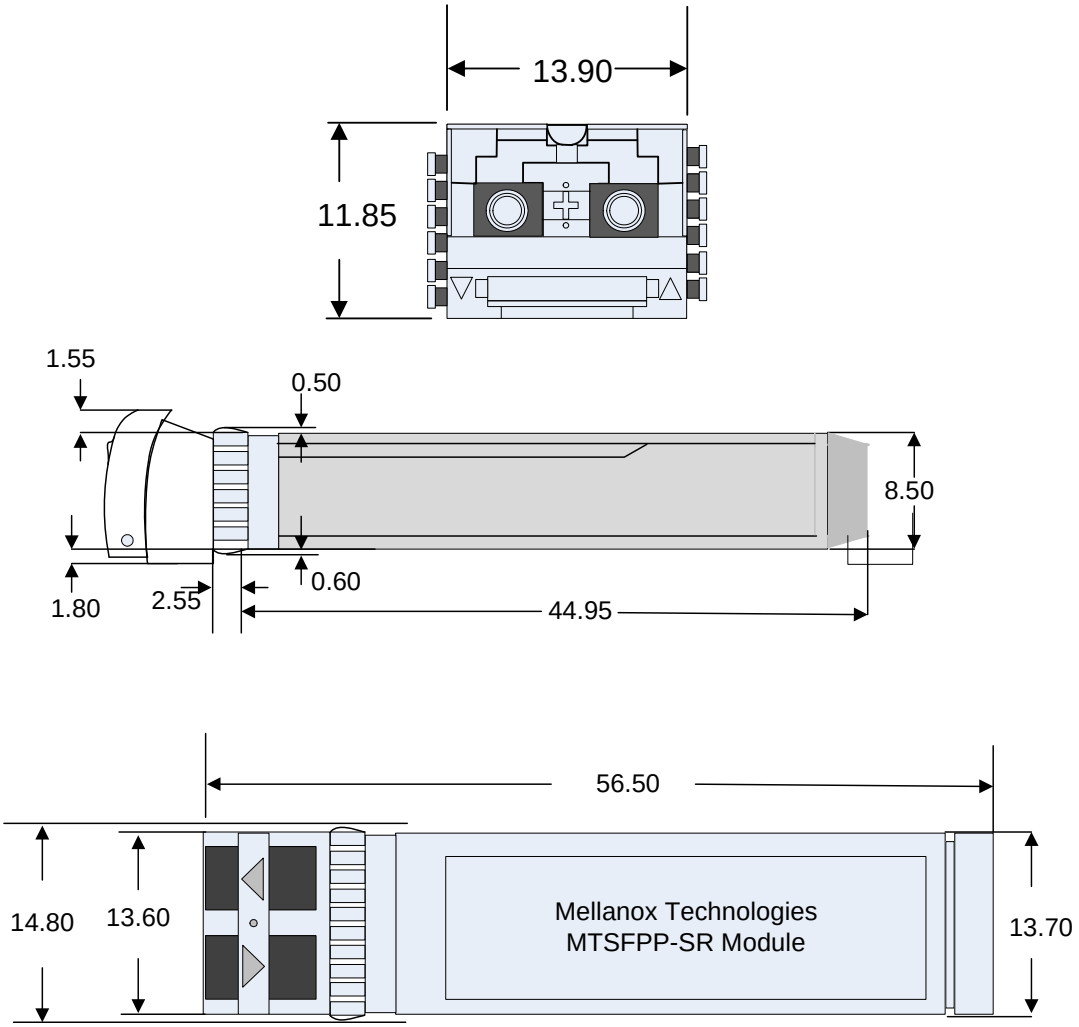
A.2 EMC Certifications

The list of approved certifications per switch in different regions of the world is located on the Mellanox website at:

www.mellanox.com/related-docs/user_manuals/Regulatory_and_Compliance_Guide.pdf

EMC statements are also in the Regulatory and Compliance Guide.

Appendix B: SFP+ Interface



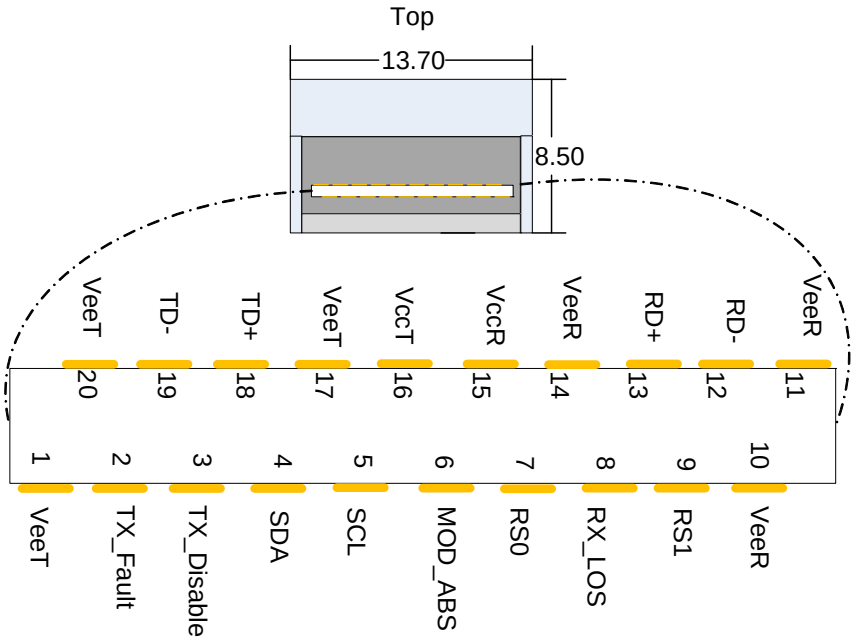


Table 10 - SFP+ Pinout

Pin	Symbol Name	Description
1	VeeT	Transmitter Ground (Common with Receiver Ground) [a]
2	TX_Fault	Transmitter Fault.[b]
3	TX_Disable	Transmitter Disable. Laser output disabled on high or open. [c]
4	SDA	2-wire Serial Interface Data Line [d]
5	SCL	2-wire Serial Interface Clock Line [d]
6	MOD_ABS	Module Absent. Grounded within the module [d]
7	RS0	No connection required
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation. [e]
9	RS1	No connection required
10	VeeR	Receiver Ground (Common with Transmitter Ground) [a]
11	VeeR	Receiver Ground (Common with Transmitter Ground)[a]
12	RD-	Receiver Inverted DATA out. AC Coupled
13	RD+	Receiver Non-inverted DATA out. AC Coupled

Table 10 - SFP+ Pinout

Pin	Symbol Name	Description
14	VeeR	Receiver Ground (Common with Transmitter Ground) [a]
15	VccR	Receiver Power Supply
16	VccT	Transmitter Power Supply
17	VeeT	Transmitter Ground (Common with Receiver Ground) [a]
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.
19	TD-	Transmitter Inverted DATA in. AC Coupled.
20	VeeT	Transmitter Ground (Common with Receiver Ground)[a]

a. Circuit ground is internally isolated from chassis ground.
b. T_{FAULT} is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
c. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V
d. Should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
e. LOS is open collector output. Should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Appendix C: QSFP Interface

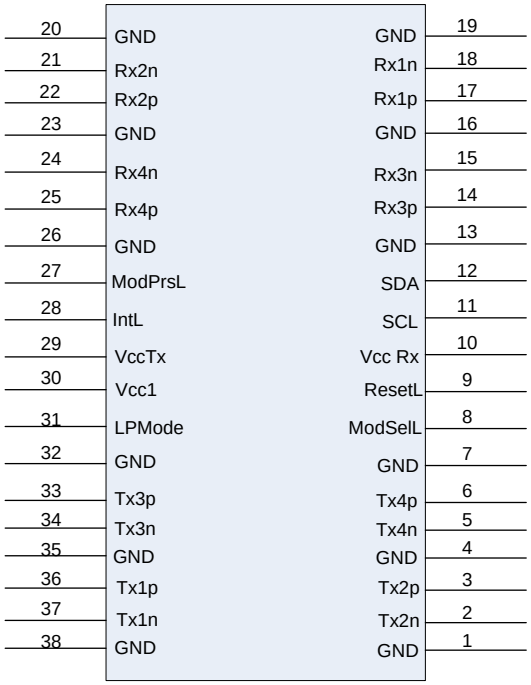
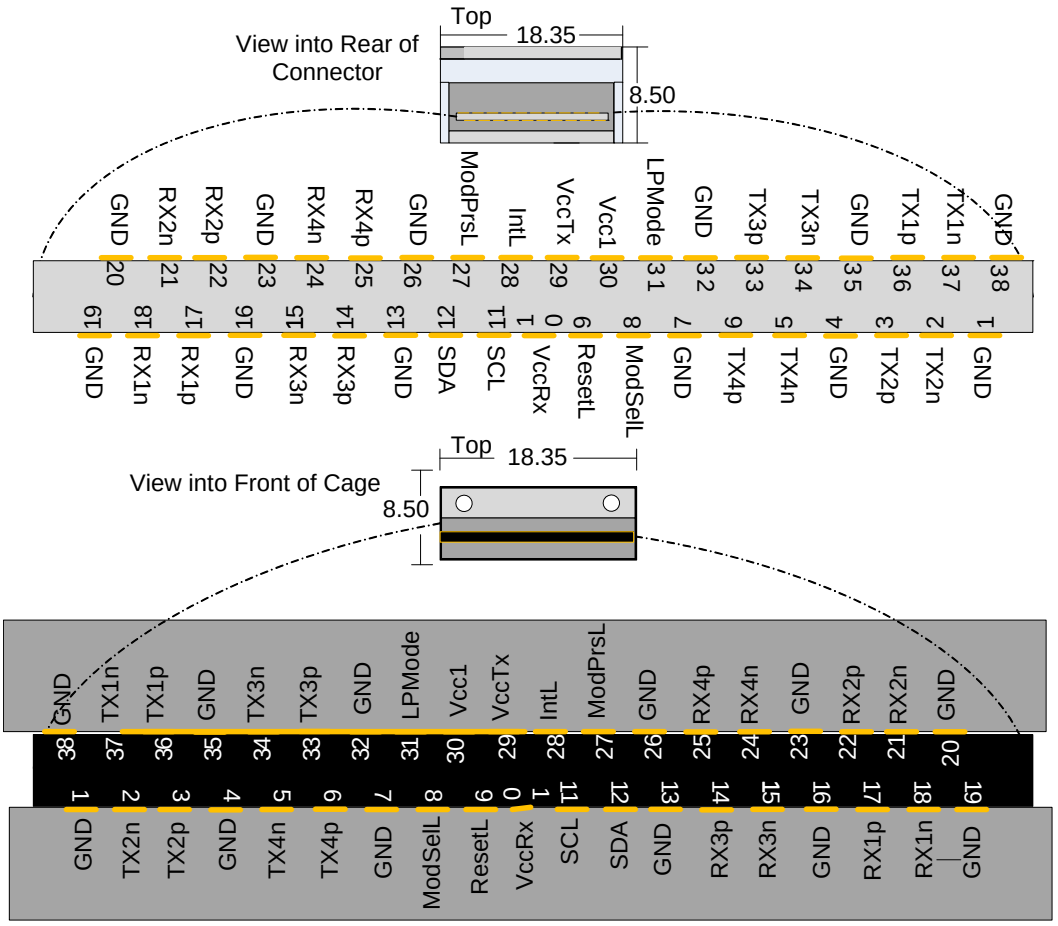


Table 11 - InfiniBand QSFP Connector Pinout

Connector Pin Number	Connector Pin Name	Signal Description
1	GND	Ground
2	Tx2n	Transmitter Inverted Data Input
3	Tx2p	Transmitter Non-Inverted Data Input
4	GND	Ground
5	Tx4n	Transmitter Inverted Data Input
6	Tx4p	Transmitter Non-Inverted Data Input
7	GND	Ground
8	ModSelL	Module Select
9	ResetL	Module Reset
10	Vcc Rx	+3.3 V Power supply receiver
11	SCL	2-wire serial interface clock
12	SDA	2-wire serial interface data
13	GND	Ground
14	Rx3p	Receiver Non-Inverted Data Output
15	Rx3n	Receiver Inverted Data Output
16	GND	Ground
17	Rx1p	Receiver Non-Inverted Data Output
18	Rx1n	Receiver Inverted Data Output
19	GND	Ground
20	GND	Ground
21	Rx2n	Receiver Inverted Data Output 3
22	Rx2p	Receiver Non-Inverted Data Output 3
23	GND	Ground
24	Rx4n	Receiver Inverted Data Output 3
25	Rx4p	Receiver Non-Inverted Data Output 3
26	GND	Ground
27	ModPrsL	Module Present
28	IntL	Interrupt
29	Vcc Tx	+3.3 V Power supply transmitter
30	Vcc 1	+3.3 V Power Supply
31	LPMode	Low Power Mode
32	GND	Ground
33	Tx3p	Transmitter Non-Inverted Data Input
34	Tx3n	Transmitter Inverted Data Input
35	GND	Ground
36	Tx1p	Transmitter Non-Inverted Data Input
37	Tx1n	Transmitter Inverted Data Input
38	GND	Ground

Figure 17: QSFP Male and Female Connections



Appendix D: Replacement Parts Ordering Numbers

Table 12 - Replacement Parts Ordering Numbers

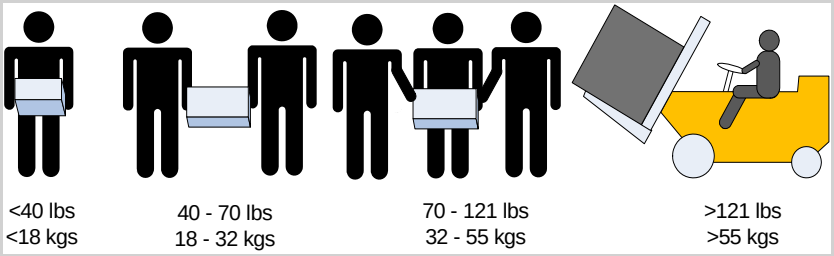
Part Description	OPN
Centered single switch installation kit	MIS000811
Side by side installation kit with long rail slides supports 19” racks with depth of 630mm-800mm	MIS000830
Side by side installation kit with short rail slides supports 19” racks with depth of 400mm-550mm	MIS000831
RS232 Cable RJ45 to DB9 Harness	HAR000028
I2C DB9 or RJ45 to USB Adapter	MTUSB-1
Power cord Type C13-C14 250V 10A 1.5M	ACC000251
Power cord Type C13-C14 250V 15A 2M RIGHT ANGLE	ACC000242
Power cord Type B for USA, Canada, Mexico, Taiwan Type B 6ft US 125V 10A cord	ACC000204
Power cord Type B for USA, Canada, Mexico, Taiwan 125V15A 4M USA UL (Type B) RIGHT ANGLE	ACC000241
Power cord Type H for Israel	ACC000205
Power cord Type E/F for Sweden, France, Germany, Netherlands, Russia	ACC000207
Power cord Type G for UK	ACC000208
Power cord Type D for India	ACC000209
Power cord Type I for China	ACC000210
Power cord Type J for Switzerland	ACC000211
Power cord Type B for Japan,	ACC000212
Power cord Type I for Australia	ACC000213

Appendix E: Avertissements de sécurité d'installation (French)

1. Instructions d'installation

Lisez toutes les instructions d'installation avant de brancher le matériel à la source d'alimentation électrique.

2.



3. Température excessive

Ce matériel ne doit pas fonctionner dans une zone avec une température ambiante dépassant le maximum recommandé de 45°C (113°F). Un flux d'air de 200LFM à cette température ambiante maximale est nécessaire. En outre, pour garantir un bon écoulement de l'air, laissez au moins 8 cm (3 pouces) d'espace libre autour des ouvertures de ventilation.

4. Empilage du châssis

Le châssis ne doit pas être empilé sur un autre matériel. Si le châssis tombe, il peut provoquer des blessures corporelles et des dégradations de biens.

5. Système de fusible neutre/à double pôle

Avertissement: Système de fusible neutre/à double pôle. Veuillez debrancher tous les cordons d'alimentation avant d'ouvrir le boitier de ce produit ou de toucher un de ses composants internes.

6. Orages – dangers électriques

Pendant un orage, il ne faut pas utiliser le matériel et il ne faut pas brancher ou débrancher les câbles.

7. Branchement/débranchement des câbles InfiniBand en cuivre

Les câbles InfiniBand en cuivre sont lourds et ne sont pas flexibles, il faut donc faire très attention en les branchant et en les débranchant des connecteurs. Consultez le fabricant des câbles pour connaître les mises en garde et les instructions spéciales.

8. Montage et entretien sur baie

Lorsque ce produit est monté ou entretenu sur baie, il faut prendre des précautions spéciales pour s'assurer que le système reste stable. En général, il faut remplir la baie avec du matériel de bas en haut.

9. Forts Courants de Fuite High Leakage Current

Attention: Forts courants de fuite. Il est essentiel de relier a la terre avant de brancher l'alimentation.

10. Ajouter une information de connexion à la masse Connect a Valid Ground to this Device

Avant de brancher l'appareil à la conduite d'alimentation, les vis de protection à la terre du terminal de l'appareil doivent être appliquées à l'installation de protection à la Terre du bâtiment.

11. Installation du matériel

Ce matériel ne doit être installé, remplacé ou entretenu que par du personnel formé et qualifié.

12. Elimination du matériel

L'élimination de ce matériel doit s'effectuer dans le respect de toutes les législations et réglementations nationales en vigueur.

13. Codes électriques locaux et nationaux

Ce matériel doit être installé dans le respect des codes électriques locaux et nationaux.

14. Codes d’installation

L’appareil doit être installé selon l’ancienne version des codes électriques nationaux du pays. Pour l’Amérique du Nord, l’équipement doit être installé conformément aux spécifications du Code Electrique National Américain et du Code Electrique Canadien.

15. Interconnexion des unites

Les câbles de branchement à l’unité RS232 et les interfaces Ethernet doivent être certifiés UL de type DP-1 ou DP-2. (Note - lorsqu’il existe dans un circuit non LPS)

Protection contre la surintensité : Un appareil de protection répertorié facilement accessible contre la surintensité du circuit de branchement et calibré à 20A doit être incorporé dans le câblage électrique du bâtiment.

16. S’assurer que les enceintes sont appropriées

Des enceintes électriques, mécaniques et incendie adaptées doivent être fournies par le fabricant du produit final ou par l’utilisateur final.

17. Cordons électriques CA homologués UL

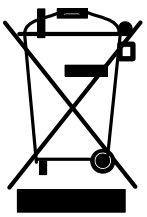
Pour les prises électriques en Amérique du Nord, choisissez un cordon électrique homologué UL et certifié CSA

à 3 conducteurs, [18 AWG], terminé par une fiche moulée, d’une tension nominale de 125 V, [15 A], avec une longueur minimale de 1,5 m [6 pieds] et d’une longueur maximale de 4,5 m [18 pieds]

Pour les prises électriques en Europe, choisissez un cordon électrique harmonisé internationalement et marqué "<HAR>",

à 3 conducteurs, d’un diamètre de fil minimum de 0,75 mm2, d’une tension nominale de 300 V, avec une gaine isolée en PVC. Le cordon doit avoir une fiche moulée d’une tension nominale de 250 V et d’une intensité nominale de 10 A.

18. La Directive WEEE



Conformément à la Directive WEEE 2002/96/EC, les déchets d'équipements électriques et électroniques (EEE) doivent être triés et ne peuvent être éliminés avec les déchets ménagers.

Veuillez disposer de ce produit et de tous ses composants de manière responsable et respectueuse de l’environnement.

Anhang F: Installation - Sicherheitshinweise (German)

1. Installationsanleitungen

Lesen Sie alle Installationsanleitungen, bevor Sie das Gerät an die Stromversorgung anschließen.

2. Übertemperatur

Dieses Gerät sollte nicht in einem Bereich mit einer Umgebungstemperatur über der maximal empfohlenen Temperatur von 45°C (113°F) betrieben werden. Es ist ein Luftstrom von 200 LFM bei maximaler Umgebungstemperatur erforderlich. Außerdem sollten mindestens 8 cm (3 in.) Freiraum um die Belüftungsöffnungen sein, um einen einwandfreien Luftstrom zu gewährleisten.

3. Stapeln des Chassis

Das Chassis sollte nicht auf andere Geräte gestapelt werden. Wenn das Chassis herunterfällt, kann es zu Verletzungen und Beschädigungen an Geräten führen.

4. Redundanter Stromversorgungsanschluss - Elektrische Gefahr

Dieses Produkt verfügt über eine Abdeckung über dem Bereich für die redundante Stromversorgung. Betreiben Sie das Produkt nicht, wenn diese Abdeckung nicht sicher festsitzt oder entfernt wurde.

5. Bei Gewitter - Elektrische Gefahr

Arbeiten Sie während eines Gewitters und Blitzschlag nicht am Gerät, schließen Sie keine Kabel an oder ab.

6. Anschließen/Trennen von InfiniBand-Kupferkabel

InfiniBand-Kupferkabel sind schwer und nicht flexible. Deshalb müssen sie vorsichtig an die Anschlüsse angebracht bzw. davon getrennt werden. Lesen Sie die speziellen Warnungen und Anleitungen des Kabelherstellers.

7. Gafahr des elektrischen Schocks.

Gafahr des elektrischen Schocks. Entferrnen des Netzsteckers elnes Netzteils spannungsfrei. Um alle Einhieten spannungsfrei zu machen sind die Netzstecker aller Netzteile zu entfernen

Risk of electric shock and energy hazard.
The PSUs are all independent.
Disconnect all power supplies to ensure a powered down state inside of the switch platform.

8. Rack-Montage und Wartung

Wenn dieses Produkt in einem Rack montiert oder gewartet wird, sind besondere Vorsichtsmaßnahmen zu ergreifen, um die Stabilität des Systems zu gewährleisten. Im Allgemeinen sollten Sie das Gestell von unten nach oben mit Geräten füllen.

9. Geräteinstallation

Diese Gerät sollte nur von geschultem und qualifiziertem Personal installiert, ausgetauscht oder gewartet werden.

10. Geräteentsorgung

Die Entsorgung dieses Geräts sollte unter Beachtung aller nationalen Gesetze Bestimmungen erfolgen.

11. Regionale und nationale elektrische Bestimmungen

Dieses Gerät sollte unter Beachtung der regionalen und nationalen elektrischen Bestimmungen installiert werden.

12. Richtigen Schutz sicherstellen

Geeigneter elekrischer, mechanischer und Feuerschutz sind vom
Hersteller des Endprodukts oder dem Endbenutzer bereitzustellen.

13. Strahlenkontakt

Achtung – Nutzung von Steuerungen oder Einstellungen oder Ausführung von Prozeduren, die hier nicht spezifiziert sind, kann zu gefährlichem Strahlenkontakt führen..

Klasse 1 Laserprodukt und Referenzen zu den aktuellsten Lasterstandards :
ICE 60 825-1:1993 + A1:1997 + A2:2001 und EN 60825-1:1994+A1:1996+ A2:2001

14. UL-und CSA Certified Netzkabel

Für Nordamerika Stromanschluss, wählen Sie ein Netzkabel, das UL-und CSA Certified
3 - Leiter, [18 AWG], mit einem angespritztem Stecker bewertet bei 125 V, [15], mit einer Mindestlänge von 1,5 m [Six Feet] aber nicht mehr als 4,5 m.
Für die europäischen Zusammenhang, wählen Sie ein Netzkabel, das international harmonisiert und der Aufschrift "<HAR>",
3 - Leiter, mindestens 0,75 mm2 Draht, bewertet mit 300 V, mit einem PVC-Mantel isoliert. Das Kabel muss eine angespritztem Stecker bewertet bei 250 V, 10 A. "

15. Ableitstrom> 3.5mA LEAKAGE >3.5mA

WARNUNG: Hohe Ableitstrom; Earth Verbindung, bevor Sie die Verbindung von wesentlicher Bedeutung werden.

16. Add GND Verbindung Informationen

Bevor Sie dieses Gerät an das Stromnetz, die Schutzerde Terminal Schrauben dieses Gerät muss an den Schutzleiter in der Gebäudeinstallation.

17. Installation Codes

Dieses Gerät muss installiert sein, entsprechend auf die neueste Version des Landes National Electrical Code. Für Nordamerika, müssen in Übereinstimmung mit den geltenden Vorschriften in der US-amerikanischen National Electrical Code und dem Canadian Electrical Code.

18. Zusammenschaltung von EINHEITEN

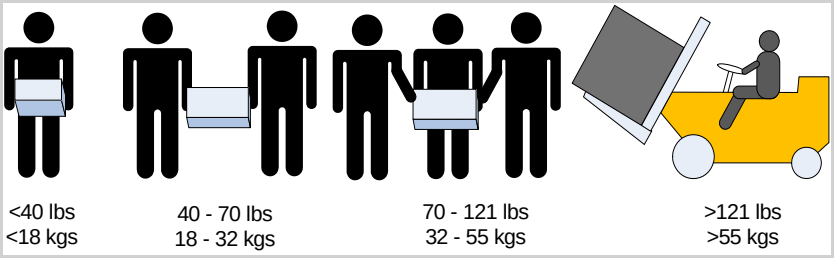
Kabel für den Anschluss an das Gerät RS232-und Ethernet-Schnittstellen müssen UL zertifiziert Typ DP-1 oder DP-2. (Hinweis-, wenn nicht mit Wohnsitz in LPS-Schaltung)

Überstromschutz: Eine leicht zugängliche Auflistung Abzweigleitung Überstrom-Schutzeinrichtung 20 A bewertet werden müssen in dem Gebäude Verkabelung.

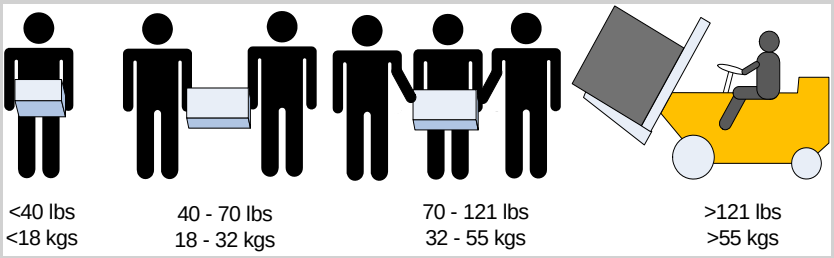
19. Zweipolige bzw. Neutralleiter-Sicherung im Netzteil

Achtung:
Zweipolige bzw. Neutralleiter-Sicherung im Netzteil. Netzstecker ziehen, um sicherzustellen, daß keine Spannung am Gerät anliegt. Entfernen Sie alle Netzkabel vor dem Öffnen der Abdeckung dieses Produkts oder dem Berühren der Innenteile.

20. Bodily Injury Due to Weight



Use enough people to safely lift this product.

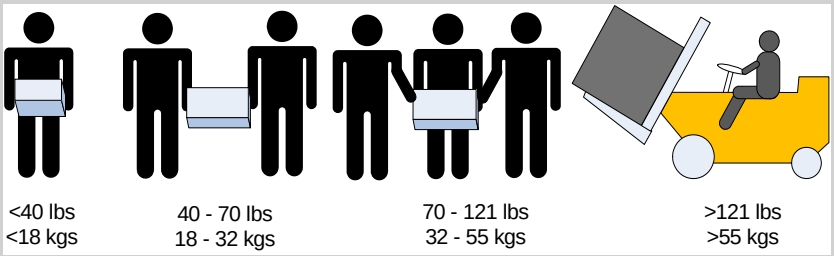


Appendix G: Advertencias de seguridad para la instalación (Spanish)

1. Instrucciones de instalación

Antes de conectar el equipo a la fuente de alimentación, leer todas las instrucciones de instalación.

2. Lesión corporal por peso



3. Lesión corporal por peso

This equipment is very heavy and should be moved using a mechanical lift to avoid injuries.

4. Sobrecalentamiento

No se debe utilizar el equipo en un área con una temperatura ambiente superior a la máxima recomendada: 45°C. Además, para garantizar una circulación de aire adecuada, se debe dejar como mínimo un espacio de 8 cm (3 pulgadas) alrededor de las aberturas de ventilación.

5. Apilamiento del chasis

Los chasis no se deben apilar sobre otros equipos. La caída del chasis podría causar lesiones corporales, así como daños al equipo.

6. Dos fusibles, uno en el polo y otro en el neutro

Dos fusibles, uno en el polo y otro en el neutro. Quitar los cables de corriente antes de abrir la tapa de este producto o tocar cualquier componente interno.

7. Cuando hay rayos: peligro de descarga eléctrica

No utilizar el equipo ni conectar o desconectar cables durante períodos de actividad de rayos.

8. Conexión y desconexión del cable Copper InfiniBand

Dado que los cables de cobre InfiniBand son pesados y no son flexibles, su conexión a los conectores y su desconexión se deben efectuar con mucho cuidado. Para ver advertencias o instrucciones especiales, consultar al fabricante del cable.

9. Montaje y mantenimiento de bastidores

Al instalar o realizar el mantenimiento de este aparato en un bastidor, es preciso adoptar precauciones especiales para garantizar que el sistema se mantenga estable. En general, en un bastidor, los equipos se deben instalar comenzando desde abajo hacia arriba.

10. Instalación de equipos

La instalación, el reemplazo y el mantenimiento de este equipo estarán a cargo únicamente de personal capacitado y competente.

11. Asegurar confinamientos adecuados

El fabricante del producto final o el usuario final deberán suministrar un confinamiento adecuado para componentes eléctricos y mecánicos y contra incendio.

12. Eliminación de equipos

La eliminación definitiva de este equipo se debe efectuar conforme a todas las leyes y reglamentaciones nacionales.

13. Códigos eléctricos locales y nacionales

Este equipo se debe instalar conforme a los códigos eléctricos locales y nacionales.

14. Cable de alimentación homologado por UL y con certificación CSA

En conexiones de América del Norte, seleccionar un cable de alimentación homologado por UL y con certificación CSA de tres conductores, [16 AWG], terminado en un enchufe moldeado con capuchón de 125 voltios nominal, [13 A], con una longitud mínima de 1,5 metros, pero no más de 4,5 metros.

En conexiones europeas, seleccionar un cable de alimentación armonizado internacionalmente y marcado "<HAR>", de tres conductores, hilo de 1,0 mm2 como mínimo, 300 voltios nominal, con cobertura protectora aislante de PVC. El cable debe tener un enchufe moldeado con capuchón de 250 voltios nominal, 10 A.

15. Añadir conexión a tierra

Antes de conectar el dispositivo a la línea de alimentación, los tornillos del terminal de la puesta a tierra de protección del dispositivo se deben conectar a la puesta a tierra de protección de la instalación del edificio.

(Información de conexión a tierra):

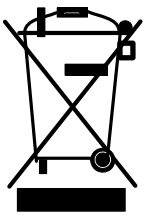
La instalación del edificio deberá prover un medio para la conexión con la puesta a tierra de protección y un técnico de servicio deberá conectar permanentemente el equipo a dicho medio de conexión.

Un TÉCNICO DE SERVICIO comprobará si la toma eléctrica de la que se suministrará corriente al equipo provee una conexión con la puesta a tierra de protección del edificio. De no ser así, el TÉCNICO DE SERVICIO se encargará de instalar un CONDUCTOR DE CONEXIÓN A TIERRA DE PROTECCIÓN, del terminal de puesta a tierra de protección separado al conductor de tierra de protección del edificio. El equipo se instalará en un área donde haya conexión equipotencial, como por ejemplo, un centro de telecomunicaciones o una sala de computadoras dedicada.

16. Códigos de instalación

Este dispositivo se debe instalar conforme a la versión más reciente de los códigos eléctricos nacionales del país en cuestión. En América del Norte, el equipo se debe instalar de acuerdo con las disposiciones vigentes del Código Eléctrico Nacional de los EE.UU. y del Código Eléctrico de Canadá.

17. Directiva sobre RAEE



Conforme a la Directiva 2002/96/CE sobre RAEE, todos los residuos de equipos eléctricos y electrónicos (EEE) se deben recolectar por separado y no se deben eliminar junto con residuos domésticos.

Al deshacerse de este producto y de todas sus partes, hágalo de una manera responsable y respetuosa con el medio ambiente.

18.

Appendix H: Special Regulations Regarding Finland, Sweden, Denmark, and Norway

Denmark- This unit is class I and must be connected with an AC cord compliant with all national electrical codes in Denmark. The AC cord shall have an integral ground wire, and can only be plugged into a fully grounded outlet.

Do not connect this unit to any outlet that is not fully grounded!

- **Finland -**

"Laite on liitettävä suojamaadoituskoskettimilla varustettuun pistorasiaan"

- **Norway -**

"Apparatet må tilkoples jordet stikkontakt"
Unit is intended for connection to IT power systems for Norway only.

- **Sweden -**

"Apparaten skall anslutas till jordat uttag."